

MEASUREMENT OF REFLECTIVITY, RAINRATE, AND VELOCITY PROFILES IN CONVECTIVE SYSTEMS DURING TOGA-COARE

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ORAL PRESENTATION

The vertical profiles of reflectivity, rainrate, and vertical velocity provide information on both the microphysics and dynamics of convective systems. Here we report on the measurement of these profiles in **mesoscale** convective systems during **TOGA-COARE** using data acquired by the ARMAR radar, which flew on the NASA DC-8 aircraft. The DC-8 normally operated at an altitude of 10 to 12 km. ARMAR operated on all 13 DC-8 flights during TOGA-COARE and provided measurements from the surface up to roughly 1 km below the aircraft altitude. The **normal** operating mode was single polarization reflectivity y , velocity, and radiometric brightness temperature. However, dual-polarization data were acquired in a number of cases.

Because ARMAR operates at the Tropical Rainfall Measuring Mission (TRMM) radar frequency of 14 GHz, the measured reflectivity y may be substantially y lower than the actual reflectivity due to attenuation. Consequently, it is necessary to use a rain **profile** retrieval algorithm which accounts for attenuation. We have developed such an algorithm using the formalism of an Extended Kalman Filter. Application of this algorithm to the measured profile results in retrieval of a parametrized drop size distribution as a function of altitude. From this, we calculate the true reflectivity, the rainrate, and the terminal Doppler velocity profiles. Using the observed Doppler velocity and the calculated terminal Doppler velocity, the updraft/downdraft velocity profile is calculated,

All 13 flights encountered systems producing rainfall. These systems included both isolated convective cells and large **mesoscale** convective systems. Additionally, three flights were made over Tropical Cyclone Oliver, one each during formation, peak intensity, and mature/decaying stage. Using the method described above, we derive statistics of the reflectivity, **rainrate**, and velocity profiles for a variety of cases, separating stratiform and convective rainfall regimes. Where available, we have used dual-polarization measurements to aid in the **microphysical** interpretation of the resulting profiles.

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